Chapter Three:
Airport Roles

INTRODUCTION

An important initial step in analyzing the future requirements of an airport system is examining the existing system to identify how each airport is currently functioning. In order to identify each airport's current functional role in the system, a detailed analysis based on factors that reflect the contributions made to the overall system was conducted. Factors that reflect contributions made to the overall system include, but are not limited to, factors related to activity, facilities, and accessibility. Based on this analysis, airports in Vermont's existing system of public-use airports are classified, or stratified, in different functional levels.

SYSTEM STRATIFICATION FACTORS

As previously described, the factors chosen in this analysis are reflective of the contributions made by each individual airport to the overall system. The specific factors were also selected because they can be quantified allowing airports to be objectively compared to one another. This analysis focuses on how each airport is currently contributing to the overall system. The system analysis and system recommendations tasks identify recommended future role changes necessary to

improve overall performance relative to the system benchmarks previously identified in this study.

The airport stratification factors selected for this analysis are listed below:

- Population within 20 Nautical Miles
- Based Aircraft
- Total Operations
- Approach Type
- Runway Surface
- IFR Operations (Instrument Flight Rule)
- Runway Length
- Economic Impact

The following sections summarize the system stratification process and explain the methodology used to quantify each airport's current contribution to the system. Included in the description of the system stratification process is a summary of each factor examined in the analysis and descriptions of the specific data used.

SYSTEM STRATIFICATION PROCESS

The system stratification process is intended to identify each airport's current role in, or overall contribution to, Vermont's system of airports. Through the stratification process, each system airport was given an actual numeric rating for each of the airport stratification factors previously described. A scale of zero through ten was used to stratify airports with respect to each factor based on raw data collected from the inventory chapter or other data sources. Ten signified the highest rating, representing that the airport(s) had the highest quantified result in the relevant analysis. A score of zero was only assigned only if an airport lacked the specific factor; otherwise a score of one was given to represent that an airport fell in the lowest range of airports for that given factor. For presentation purposes within this study, airports are shown alphabetically.

The methodology used to stratify each airport with respect to the eight factors used in this analysis and the data sources used in the process are briefly described in the following sections. In addition, the outcome of the scoring process is summarized. **Table 3-1** presents the data used for each airport in the system stratification process.

Table 3-1
Stratification Factors and Raw Data

Airport Name	City	Pop. within 20 NM	Based Aircraft	Total Ops	Approach Type	Runway Surface	IFR Operations	Runway Length (ft.)	Economic Impact
Basin Harbor	Vergennes	143,781	0	2,100	Visual	Turf	0	3,000	620,412
Burlington International	Burlington	224,820	91	103,099	Precision	Asphalt-Grooved	1,971	8,320	514,336,023
Caledonia County State	Lyndonville	56,891	19	2,050	Non-Precision	Asphalt	2	3,300	6,108,471
Edward F. Knapp State	Barre/Montpelier	91,855	60	32,000	Precision	Asphalt	102	5,002	12,132,885
Fair Haven Municipal	Fair Haven	98,408	2	400	Visual	Gravel	0	1,950	246,551
Franklin County State	Highgate	75,856	53	21,400	Non-Precision	Asphalt	1	3,000	1,608,812
Hartness State	Springfield	98,958	37	9,300	Non-Precision	Asphalt	56	5,498	1,291,724
John H. Boylan State	Island Pond	40,567	1	200	Visual	Turf	0	2,650	53,958
Middlebury State	Middlebury	75,081	50	35,250	Visual	Asphalt	0	2,500	20,937,611
Morrisville-Stowe State	Morrisville	92,572	29	18,020	Non-Precision	Asphalt	38	3,701	12,231,886
Mount Snow	West Dover	112,294	7	6,600	Non-Precision	Asphalt	0	2,650	1,650,878
Newport State	Newport	35,788	17	7,140	Non-Precision	Asphalt	34	4,000	357,262
Post Mills	Post Mills	99,543	29	9,510	Visual	Turf	0	2,900	3,245,887
Rutland State	Rutland	90,745	41	29,224	Non-Precision	Asphalt	484	5,000	21,699,807
Shelburne	Shelburne	188,622	56	3,000	Visual	Turf	0	2,500	N/A
Warren-Sugarbush	Warren	112,267	70	22,500	Visual	Asphalt	0	2,575	658,145
William H. Morse State	Bennington	150,930	50	26,520	Non-Precision	Asphalt	13	3,704	11,377,300

Source: FAA 5010 Airport Master Record, Wilbur Smith Associates, GCR & Associates-Airport IQ Data Center

POPULATION WITHIN 20 NAUTICAL MILES

Estimates of total population within a 20-nautical mile radius of Vermont's airports were gathered to identify the approximate number of Vermont's citizens provided access to aviation facilities and service by each airport. Population data was analyzed using ArcGIS 9, a Geographic Information System (GIS) program. Census block information provided from the 2000 U.S. Census was used to compile and sum the estimated population that was located within a 20-nautical mile radius of each airport. While there are more recent estimates of population, the 2000 Census provided the most detail with regard to counts at the block level which could then be allocated to each system airport. For the three airports located within 20-nautical miles of Canada, estimated populations were provided by ArcGIS 9, which contains population data from 1996 on a municipal-level for Canada.

Estimates of total population within the identified 20-nautical mile radius of a system airport ranged from over 224,820 at Burlington International to 47,214 at John H. Boylan State. Based on the results, airports were stratified into 5 groupings based upon natural breaks in the population data and given ratings from two, for airports capturing the lowest amount of the State's population, to ten being the greatest.

BASED AIRCRAFT

Airports are stratified based on the total number of permanently based aircraft. Data presented in Chapter 2, *Inventory*, represents the most current count of based aircraft at each system airport. Total based aircraft counts at Vermont airports ranged from zero at Basin Harbor to a high of 91 at Burlington International Airport. Airports were placed into groups based upon five natural breaks in the based aircraft data, and given a score between two and ten. It should be noted that Basin Harbor received no points in the based aircraft stratification process because data indicates that there are no aircraft permanently based at that airport.

TOTAL OPERATIONS

Airports are stratified based on the number of total annual aircraft operations occurring at the airport. Annual data for 2004 was used in this analysis. Actual activity counts are only available for Burlington International Airport because it is the only airport in the State with an air traffic control tower. Total operations at each of the other airports represent estimates and were taken from FAA 5010 Form, Airport Master Record.

Data indicates that Burlington International accommodated the most aircraft operations in 2004, with a total of approximately 104,000 operations. The lowest
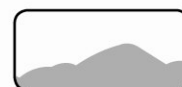
estimates of total annual operations correspond to a turf runway airport, John H. Boylan State. It is estimated that approximately 200 total annual operations occurred at this facility. System airports were placed into one of five groups based upon natural breaks in the total operations, and rated on a scale of two through ten.

APPROACH TYPE

Available approach types at each airport are another factor used in the system stratification process. Airports are evaluated based on the most advanced, or most demanding, published approach available. The following approach categories are used:

- Precision Approach
- Non-Precision Approach
- Visual Approach

A precision approach provides the highest degree of accessibility and is typically preferred by aircraft operators using larger, more advanced aircraft, such as corporate jets. Airports having a published precision approach were given a rating of ten in the stratification process. Airports with non-precision approaches were given five points. Airports that only have a visual approach, which restricts their ability to accommodate aircraft operations during periods of reduced visibility, were given one point.

RUNWAY SURFACE

Airports are stratified based on the surface type of the primary runway. Primary runway surfaces at Vermont airports include:

- Grooved-Asphalt
- Asphalt
- Gravel
- Turf

Inventory data from Chapter 2 provides information on the various runway surface types at each Vermont airport. There are four types of surfaces identified, and scores were distributed based upon the type of surface. Burlington International, which has a grooved-asphalt runway, received the highest rating with a score of ten. Ratings of nine were given to asphalt runways and five for turf and gravel surfaces.

IFR OPERATIONS

Airports are stratified based on available data that provides an estimate of the number of annual general aviation aircraft operations that were conducted at each airport in 2004 by aircraft that had filed instrument flight plans. This factor was selected because it gives an indication of the overall amount of business/corporate aviation activity occurring at each airport and each airport's corresponding contribution to economic development in its area. For this analysis, data for such activity at Vermont's airports was gathered from GCR Associates Inc., which collects and maintains databases of private general aviation operations at airports nationwide.

Counts of total aircraft operations conducted with instrument flight plans were compiled for the year 2004, and stratified by six natural breaks in the totals. Nine of the smaller airports did not have any recorded IFR operations, and as a result received a score of zero. A rating between five and ten was given to the airports that had at least one recorded IFR operation in 2004. GCR data indicates that Burlington International Airport had the most recorded general aviation IFR operations with a total of 1,971 in 2004. It should be noted that general aviation operations conducted in visual meteorological conditions without an instrument flight plan are not included in this data.

RUNWAY LENGTH

Airports are stratified based on the length of their primary runway. Runway lengths as presented in Chapter 2, *Inventory*, are used in this analysis. For those airports having more than one runway, the length of the longest runway is used in the stratification process. Primary runway lengths at Vermont airports range from 8,320 feet at Burlington International Airport to 2,500 feet and under at several airports. A rating of two through ten was given to each airport based on significant runway lengths that are due to the type of aircraft that can operate at certain lengths.

ECONOMIC IMPACT

To provide a measure of each airport's contribution to regional and State economies, system airports are stratified based on their relative level of economic impact, as identified in the 2003 Statewide Airport Economic Impact Study. The economic impact study was prepared for the Vermont Agency of Transportation and provides economic impact data for 16 of the current 17 system plan airports.

Estimated total economic impacts at Vermont airports ranged from more than $514 million at Burlington International Airport to under $54,000 dollars at turf runway airports such as John H. Boylan State. The estimated economic impacts were
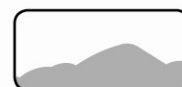
stratified into scores of one through ten based on natural breaks in the data. Shelburne was not included in the study prepared in 2003. As a result, Shelburne was scored the same as other airports with similar facilities and activity.

SYSTEM STRATIFICATION DATA AND RESULTS

Once system airports were ranked by the eight system contribution factors, each of the factors was then reviewed based upon an overall importance to the system. Three factors were considered to have a significantly greater impact and importance to the overall system and the State. These include:

- IFR Operations
- Runway Length
- Economic Impact

In discussions between the VTrans Working Group and through the knowledge and national experience of the consultant, it was determined that these three factors be weighted in the role stratification process, in order to represent their increased importance to the overall system. It was determined that these factors be multiplied by a factor of three. Each airport's final weighted score for all system stratification factors was then summed. **Table 3-2** presents the study airports and the results of the stratification process for each of the factors examined in this analysis.
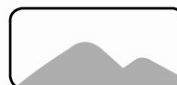
Table 3-2
Stratification Factors and Ratings

Airport Name	City	Non-Weighted Scores						Weighted Scores		Total Weighted Score
		Pop. within 20 NM	Based Aircraft	Total Ops	Approach Type	Runway Surface	IFR Ops	Runway Length (ft.)	Economic Impact	
John H. Boylan State	Island Pond	2	2	2	1	5	0	4	1	27
Fair Haven Municipal	Fair Haven	6	2	2	1	5	0	2	2	28
Basin Harbor	Vergennes	8	0	2	1	5	0	4	4	40
Shelburne	Shelburne	10	8	2	1	5	0	4	1	41
Post Mills	Post Mills	6	6	4	1	5	0	4	6	52
Mount Snow	West Dover	6	2	4	5	9	0	4	5	53
Warren-Sugarbush	Warren	6	8	6	1	9	0	4	4	54
Caledonia County State	Lyndonville	2	4	2	5	9	5	4	7	70
Newport State	Newport	2	4	4	5	9	6	7	3	72
Middlebury State	Middlebury	4	8	8	1	9	0	4	9	69
Franklin County State	Highgate	6	8	6	5	9	5	4	5	76
Morrisville-Stowe State	Morrisville	6	6	6	5	9	6	5	8	89
Hartness State	Springfield	6	6	4	5	9	7	9	5	93
William H. Morse State	Bennington	8	8	8	5	9	5	5	8	92
Rutland State	Rutland	6	6	8	5	9	9	9	9	115
Edward F. Knapp State	Barre/Montpelier	6	8	8	10	9	8	9	8	116
Burlington International	Burlington	10	10	10	10	10	10	10	10	140

Source: Wilbur Smith Associates

AIRPORT FUNCTIONAL LEVELS

The objective of this exercise is to group the airports into functional levels based on their current contribution to the State's airport system and the airport's current role in meeting statewide aviation needs. The functional levels that are developed for use in the Vermont Airport System Plan are developed based on the results of the stratification process and are intended to segregate the system's existing airports based on their current contribution to the statewide airport system as a whole. The four different functional levels that have been identified in this analysis represent groupings that occurred as a result of an analysis that examined a number of factors, including proximity to population, types of existing facilities, and current activity levels.

Through the system stratification process, airports are stratified based on the eight factors previously described. At the conclusion of the rating process, airports are given a score that included three weighted factors in the total score. When these overall scores are sorted from high to low, natural breaks occurred in the sorting. These natural breaks are the points at which the airports are segregated into functional levels.

Based on the scoring process previously described, system airports are divided into four functional levels. The four functional levels were chosen based on several discussions between the VTrans Working Group and the consultant, and have been used in other state system plans, and are commonly used throughout the country. The functional roles are:

- National Service
- Regional Service
- Local Service
- Specialty Service

Table 3-3 illustrates the results of this process and identifies the associated functional role of each system airport. **Exhibit 3-1** graphically depicts the results of this roles analysis and the location of airports in each airport role category.

Table 3-3
Vermont Airport System Functional Roles

Functional Role	Airport Name	City	Score
National Service	Burlington International	Burlington	140
	Edward F. Knapp State	Barre/Montpelier	116
	Rutland State	Rutland	115
Regional Service	Hartness State	Springfield	93
	William H. Morse State	Bennington	92
	Morrisville-Stowe State	Morrisville	89
Local Service	Franklin County State	Highgate	76
	Newport State	Newport	72
	Caledonia County State	Lyndonville	70
	Middlebury State	Middlebury	69
Specialty Service	Warren-Sugarbush	Warren	54
	Mount Snow	West Dover	53
	Post Mills	Post Mills	52
	Shelburne	Shelburne	41
	Basin Harbor	Vergennes	40
	Fair Haven	Fair Haven	28
	John H Boylan State	Island Pond	27

Source: Wilbur Smith Associates

Vermont Airport System and Policy Plan

Canada

ME

FRANKLIN COUNTY STATE

NEWPORT STATE

Franklin

Orleans

Lamoille

JOHN H BOYLAN STATE (ISLAND POND)

Essex

MORRISVILLE-STOWE STATE

Chittenden

CALEDONIA COUNTY STATE

BURLINGTON INTL

Caledonia

SHELBURNE

Washington

EDWARD F KNAPP STATE

Addison

BASIN HARBOR

WARREN-SUGARBUSH

Orange

MIDDLEBURY STATE

POST MILLS

NY

FAIR HAVEN MUNICIPAL

Rutland

NH

Windsor

RUTLAND STATE

HARTNESS STATE (SPRINGFIELD)

Bennington

Windham

MOUNT SNOW

WILLIAM H. MORSE STATE

N

Legend

Public-Use Airport
Functional Roles

✈ National Service

✈ Regional Service

✈ Local Service

● Specialty Service

Miles

0 4.5 9   18   27   36   45

MA

Vermont Airport System Plan

Public-Use Airport Functional Roles

Exhibit 3-1

The following sections briefly describe each of the functional role categories that have been designated for use in the system plan. These descriptions provide a general explanation of the primary types of users and activity intended to be accommodated by airports in the different airport role categories. The descriptions are not intended in any way to restrict the types of activity occurring at system airports.

- **National Service Airports** – National Service airports accommodate the highest level of general aviation activity. These airports serve a contributing role in enabling the local, regional, and statewide economy to have access to and from the national and global economy. Two of the airports in this category, Burlington International and Rutland State, also provide access to scheduled commercial airline service.

- **Regional Service Airports** – Regional airports serve primarily general aviation activity, with a focus on serving business activity including small jet and multiengine aircraft. These airports serve a significant role in supporting the local and regional economies and connecting them to the State and national economies.

- **Local Service Airports** – Local Service airports are considered to have community importance, primarily serving recreational and personal flying activities. The airports serve a contributing role in the local economy. These airports may serve some corporate/business aviation users, including jet activity; in addition to flight training, but primarily provide storage and facilities for piston-driven single and multi-engine aircraft.

- **Specialty Service Airports** – Specialty airports provide aviation services for smaller single-engine aircraft and other non fixed-wing aircraft such as ultralights and gliders, and balloons. In some cases, these airports provide access to seasonal tourist destinations in Vermont.

As described, for the various airport role categories, aviation users vary from commercial passengers and air cargo companies to recreational pilots with ultra-lights. Each functional role can serve a wide variety of these various users. These explanations are not intended to place limits or constraints on what types of aviation activity can occur at airports in each functional role, only to familiarize the reader with the primary uses that are intended to be supported by each role category.